



Trend of Causes of Brain Death in Liver Graft Donors in Northern Iran; A Shift from Trauma to Cerebrovascular Events in 30 Months

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Abstract

Background and Objectives: Brain dead donor's cause of death can potentially influence function of the transplanted liver and survival of transplant recipients. The aim of this study is to assess the trend of causes of brain death in Iranian donors.

Material and Methods: Medical charts of 181 consecutive liver donors within a period of 30 months (2013 April-2015 September) were reviewed.

Results: These data were classified based on donor's cause of brain death (DCBD) into: Traumatic (n=83, 45.9%), cerebrovascular events (n=73, 40.3%) and other brain insults (n=25, 13.8%). We compared these three groups in five 6 months periods. At the first period, among 36 donors, trauma was the leading cause (n=28, 77.8%) and cerebrovascular complications was the second comprising 13.9% causes of brain death. Trauma as a cause of brain death decreased to 28% in the last 6 months period with cerebrovascular events increasing to 56%.

Conclusion: We found a progressive rise in the proportion of donors with non-traumatic causes of brain death in a 30 months period of time. Considering the same territory of organ procurement; this can be translated to a decrease in number of fatal motor vehicle accidents. The transplant outcome in this regard is under investigation in another study.

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Introduction

Liver transplantation is the ultimate therapy for many of the end-stage liver diseases [1]. One of the major issues in liver transplantation field is the insufficient number of liver donors, which are mainly brain dead and cardiac dead patients. Selection of suitable liver donor for each patient is critical for its function and recipient's outcome [2,3]. Several donors' characteristics influence liver transplant outcome and incidence of the complications, including age, cause of death and being brain dead or cardiac dead. Among the brain dead donors, cause of brain death can potentially affect the survival of transplant recipient and the function of transplanted liver [4].

Causes of brain death are mostly traumatic or cerebrovascular events. These causes vary widely among different countries, which may have different groups of patients needing liver transplantation. The aim of this study was to assess the causes of brain death in northern part of Iran.

Materials and Methods

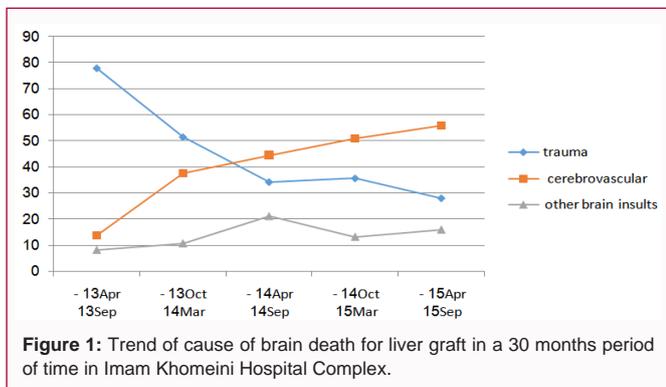
Medical charts of 181 consecutive brain dead donors whose liver was used by our center (Imam Khomeini Hospital Complex, Tehran, IR Iran) within a period of 30 months (2013 April-2015 September) were reviewed. The donors are transferred from the Tehran Province hospitals and more than 10 neighboring provinces in northern half of Iran to 3 organ procurement units in Tehran and our center has the priority to select the donor. The data were classified based on donor's cause of brain death (CBD) into: Traumatic, cerebrovascular, and other brain insults. We compared these three groups in five 6 months periods. No statistical method was used.

Results

From 181 brain dead liver donors, Trauma was the causes of brain death in 45.9% of the patients.

Table 1: Causes of brain death in 6 months periods from April 2013 to September 2015 in brain dead liver graft donors in Imam Khomeini Hospital Complex.

	Apr13- Sep13	Oct13- Mar14	Apr14- Sep14	Oct14- Mar15	Apr15-Sep15	Total
Traumatic	28 (77.8%)	19 (51.4%)	13 (34.2%)	16 (35.6%)	7 (28%)	83 (45.9%)
Cerebrovascular complications	5 (13.9%)	14 (37.8%)	17 (44.7%)	23 (51.1%)	14 (56%)	73 (40.3%)
Other brain insults	3 (8.3%)	4 (10.8%)	8 (21.1%)	6 (13.3%)	4 (16%)	25 (13.8%)
Total	36	37	38	45	25	181



This figure was 40.3% for cerebrovascular group, and 13.8% in other brain insults group. As seen in Table 1, in the first 6-months, among 36 donors, trauma was the leading cause (77.8%) and cerebrovascular events was the second cause of brain death comprising 13.9% cases of brain death. In the second 6-months period, traumatic CBD was abated to 51.4% while cerebrovascular complications and other brain insults were responsible for 48.6% of CBD. This decrease of traumatic brain death in liver donors continued until last 6-months period in which, cerebrovascular complications were the major cause of brain death (56%).

Discussion

Increased number of patients listed for liver transplantation and insufficient availability of donated organs is yet an important issue on organ allocation and despite expanding the definition of acceptable deceased donor, death on the liver waiting list still occurs in approximately 8% of the candidates [5] which is similar to the waiting list mortality in our center.

There are many complications that may occur after liver transplant including primary non-functioning, hepatic artery thrombosis and ischemic cholangiopathy [6-8]. Condition of the liver graft may influence transplant outcome in different ways. There are multiple lines of evidence comparing livers harvested from cardiac dead, brain dead and living donors [9] but not so much in the brain dead category.

Donor Risk Index (DRI) determined by seven donor characteristics has been created as a model to predict long term survival of liver transplantation and then was expanded by other studies [10,11]. Lower DRI score indicates that the organ is more suitable for transplantation [12]. Donor cause of brain death is one of the parameters of this index. It has also been shown that patients who received the organ with high DRI score have mortality rate of 3.5-folded greater than those on waiting list [13]. Although mortality prediction based on DRI depends on Model of End Stage Liver Disease (MELD) score of the recipients and mortality rate of liver recipients with high MELD score (severe disease) decreases with transplantation, regardless of the DRI score of the transplanted organ [14].

Brain trauma as a cause of brain death besides other factors including: age<40, health, height>1.70m, not to be donor after cardiac death and not to be used for split liver transplantation before, are presented as ideal characteristics of a cadaveric donor [15].

It seems that traumatic group of brain dead donors are better donors than non-traumatic ones [16]. Possible explanations include the younger age, the masculine gender, having less co-morbidities, and the lower body mass index [3,17,18]. The preference of traumatic brain dead donors over the CVA groups and others, below the donor age of 62 years of course, has been shown before [19].

Other Studies investigated the association of deceased organ donor characteristics and the organ yield, showed that the donor age affects the organ yield in a concave form and the donor age of 38 years old is optimal in terms of transplantation outcomes but this effect can be influenced by many other factors (e.g. renal function) and decreases with the donor's history of HTN, DM and high BMI [19-21]. Early graft failure as an important complication of organ transplantation is also age related and has higher incidence in the recipients of elderly organ donors [22]. We are assessing the impact of the cause of brain death on the short term results and long term outcome of liver transplant in a separate study.

Conclusion

In this article, we found a progressive rise in the proportion of donors with non-traumatic causes of brain death (Figure 1). Although the cause of this change is not fully understood, it may be due to increase in traffic monitoring by traffic police, improvement of adherence to traffic regulations by the people and changing the general culture of organ donation in traumatic and non-traumatic deaths. It may also be just an incidental finding.

We found a significant increase in number of non traumatic brain death organ donation which may influence the liver transplant outcome. We should keep eye on this number in future.

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